Aeronautical Glossary

aeronaut: One who flies balloons.

aeronautical chart: A map designed for aerial navigation. Aeronautical charts include information about airports, ground elevations, landmarks, airspace designations, routes to fly, and other aids to navigation. Aeronautical charts are regularly revised to provide current information.

airfoil: An aerodynamic surface shaped to obtain a reaction from the air through which it moves; for example, wing, rudder, aileron or rotor blade.

aerodynamics: The branch of science that deals with the motion of air and the forces on bodies moving through the air.

aileron: Control surface, traditionally hinged to outer portion of the wing and forming part of the trailing edge, that provides control in roll as well as in banking the wings into a turn.

angle of attack: An engineering term that describes the angle of an aircraft's body and wings relative to its actual flight path. It is also called alpha. High angles of attack (greater than about 10 degrees) are called high alpha.

angle of incidence: While angle of attack varies during flight, angle of incidence is fixed with the design of the aircraft. Airfoils are generally attached to the aircraft at a small angle in relation to its longitudinal axis.

aspect ratio: The ratio between the length of a wing and its width (chord). Short, stubby wings (as on most jets) have a low aspect ratio; long, narrow wings (as on gliders) have a high aspect ratio.

ATC: Air traffic control. A system that controls air traffic from airport locations. Air traffic personnel on the ground use two-way communication with aircraft crews to maintain the safe flow of aircraft in airport vicinities, and to direct aircraft on routes between airports.

attitude: The orientation of the three major axes of an aircraft (longitudinal, lateral, and vertical) with respect to a fixed reference such as the horizon, the relative wind, or direction of flight. Usually refers to the relationship between the nose of the airplane and the horizon, such as the nose is pointing "above" or "below" the horizon.

canard: Canard has a couple of meanings. It is an aircraft with the horizontal stabilizer placed ahead of the wing instead of behind it on the tail, and it also refers to a forward horizontal stabilizer. Some aircraft have canards in addition to a conventional horizontal stabilizer on the tail.

composite: Usually refers to a type of structure made with layers of fiberglass or fiberglass-like materials such as carbon fiber. The materials are called composites.

digital-fly-by-wire: A flight control system whereby instead of mechanical links (cables and pulleys) from the cockpit to the aircraft's flight controls, wires carry electronic signals. These electric/ electronic signals allow a pilot to "fly by wire." Digital refers to digital computer inputs in the system; some fly-by-wire systems use analog computers. Virtually all modern, fly-by-wire flight control systems are digital. The acronym is DFBW.

drag: Resistance of a vehicle body to motion through the air. A smooth surface has less drag than a rough one.

elevator: A movable horizontal airfoil, usually attached to the horizontal stabilizer on the tail, that is used to control pitch. It usually changes the attitude of the nose, making it move up and down.

elevon: Elevons are moveable control surfaces located on the trailing edge of the wings to control pitch and roll. Working in unison (both up or both down), they function as elevators. Working differentially (one up and one down), they function as ailerons.

fin: Another term for the vertical stabilizer (see vertical stabilizer).

flaps: Hinged, pivoted, or sliding airfoils or plates (or a combination of them) normally located at the trailing edge of the wing. They are designed to increase the wing's lift or otherwise improve an airplane's slow-flight characteristics.

flight controls: Moveable surfaces on the aircraft that control its path through the air.

flight plan: Specific information about the intended flight of an aircraft that is delivered orally or in writing with air traffic control.

flight instruction: Instruction in airplanes, and on the ground, by a person who has been certified with the Federal Aviation Administration to teach flying.

fly-by-wire: see digital-fly-by-wire.

fuselage: The main structural body of an aircraft to which the wings, tail unit, etc. are attached.

G or **g**: A symbol used to denote gravity or its effects. Also used as a unit of stress measurement for bodies undergoing acceleration, or the "loads" imposed on an aircraft and pilot. Loads may be centrifugal and aerodynamic due to maneuvering, usually expressed as g, i.e. 7 g is a load seven times the weight of the aircraft.

glider: An aircraft that does not use an engine for thrust. Gliders typically have relatively long, narrow wings (compared to powered aircraft) for maximum lift and minimum drag. A high lift-to-drag (glide) ratio allows the plane to fly a longer distance horizontally for every foot that it descends. High performance gliders, also known as sailplanes, can glide more than six-times the distance an average powered airplane can glide with its engine not operating.

hangar: A building used to house aircraft.

helicopter: A flying machine (heavier-than-air) that is uses motor-driven rotors for support in the air. These rotors also provide the main force to propel it horizontally. A rotorcraft.

horizontal stabilizer: Loosely, a fixed, horizontal tail surface, but on many supersonic aircraft the entire horizontal stabilizer moves to control pitch.

hypothesis: A hypothesis is a proposed answer to a problem, or an explanation that accounts for a set of facts and that can be tested by further experimentation and observation. The results of experimentation provide evidence that may or may not support the hypothesis.

inlet: Usually, openings that let air into a jet engine.

International Phonetic Alphabet: A system of words identifying the letters of the alphabet and numbers. The system was reached through international agreement, and uses words chosen for their ease of pronunciation by people of all language backgrounds.

lift: The sum of all the aerodynamic forces acting on an aircraft at right angles to the flight path. When the aircraft is in steady level flight the lift is equal and opposite to the weight of the aircraft. Wings create lift.

lifting body: An aircraft that uses the shape of its body to generate lift instead of using wings.

Mach number: The speed of the aircraft (true air speed) divided by the speed of sound at a given temperature. Loosely, it is the speed in terms of the speed of sound, i.e. Mach 1 is the speed of sound, Mach 2 is twice the speed of sound, etc.

meteorologist: A weather forecaster. A person knowledgeable in the field of meteorology, which is a branch of science that deals with the physical properties of the atmosphere. Meteorology deals with the way weather conditions develop and change.

NACA: National Advisory Committee for Aeronautics, NASA's predecessor, 1915 to 1958.

ornithopter: A flying machine that is supposed to support itself in the air through the use of flapping wings.

pitch, pitch attitude: Loosely, the angle between the nose of an aircraft and the horizon. The nose pitches “up” or “down” in relation to level flight. It is different from angle of attack, which is the wing’s angle relative to the aircraft’s flightpath.

ramjet: A jet engine with no mechanical compressor, consisting of specially shaped tubes or ducts open at both ends. The air necessary for combustion is shoved into the duct and compressed by the forward motion of the engine.

roll: The rotation of an aircraft about its longitudinal axis. An aircraft is turned by controlling roll and yaw. A turn is initiated by “rolling” the wings into the direction of the turn. Once the turn is established, the rolling movement is stopped. A roll in the opposite direction of the turn is used to stop the turn.

rotors: The airfoils that are used by helicopters; they are rotated at high speeds to produce lift and thrust.

rotor blades: Also known as rotors.

rotary wing aircraft: Also known as rotorcraft. An aircraft (heavier-than-air) that uses rotating airfoils (rotary wings) to produce aerodynamic lift.

rudder: The primary control surface in yaw (sideways movement), it is usually hinged and attached to the trailing edge of the vertical stabilizer on an aircraft’s tail.

runway: A surface on the ground specifically used for aircraft takeoffs and landings.

shock wave: An aircraft generates a shock wave as it flies faster than the speed of sound, pushing air molecules aside like a boat creates a bow wave. The shock wave forms a cone of pressurized air molecules which moves outward and rearward in all directions and extend to the ground.

solar-powered aircraft: Solar-powered aircraft, such as the Pathfinder, use photovoltaic cells to convert energy from the sun into electricity to power electric motors that drive the aircraft.

sonic boom: The thunder-like noise a person on the ground hears when an aircraft flies overhead faster than the speed of sound. The boom is caused by the sudden change in air pressure with the passage of a shock wave.

stall: A flight condition wherein the airflow separates from the airfoil surface, or the airflow around the airfoil becomes turbulent, causing the airfoil to lose lift. It is usually a result of insufficient airspeed or excessive angle of attack.

straight-wing: A wing that is approximately perpendicular to the fuselage.

supersonic: Faster than the speed of sound (about 750 mph at sea level).

swept-wing: A wing that has a visibly obvious, backwards or forwards inclination relative to the fuselage. The adjective swept-wing describes an aircraft that has wings which sweep forward or sweep back. Some aircraft have the ability of sweeping the wings while in flight; these wings are called variable sweep wings.

taxi way: An airport road (used primarily for the movement of aircraft) connecting the runway to hangars, terminals and other airport locations.

thrust: A force that propels an aircraft forward. Rocket and jet engine “power” is referred to in “pounds of thrust.”

tiltrotor: A rotor that is tilted from a horizontal alignment (as a helicopter) for takeoff and landing, to a vertical alignment (as an airplane) for level flight. Tiltrotor aircraft typically have the tiltrotors mounted on the tips of airplane-like wings, and achieve the flight characteristics of airplanes and helicopters.

transonic: Speeds slightly above and below the speed of sound.

vertical stabilizer: Sometimes referred to as a vertical fin, or fin, it is a vertical or inclined airfoil, usually at the tail or wing tip to increase directional stability. Sometimes the rudder is hinged to it.

weight and balance: A term referring to the distribution of weight in an aircraft and the location of its center of gravity. The center of gravity is the point where the weight is balanced. Proper weight and balance are essential for the safe operation of an aircraft.

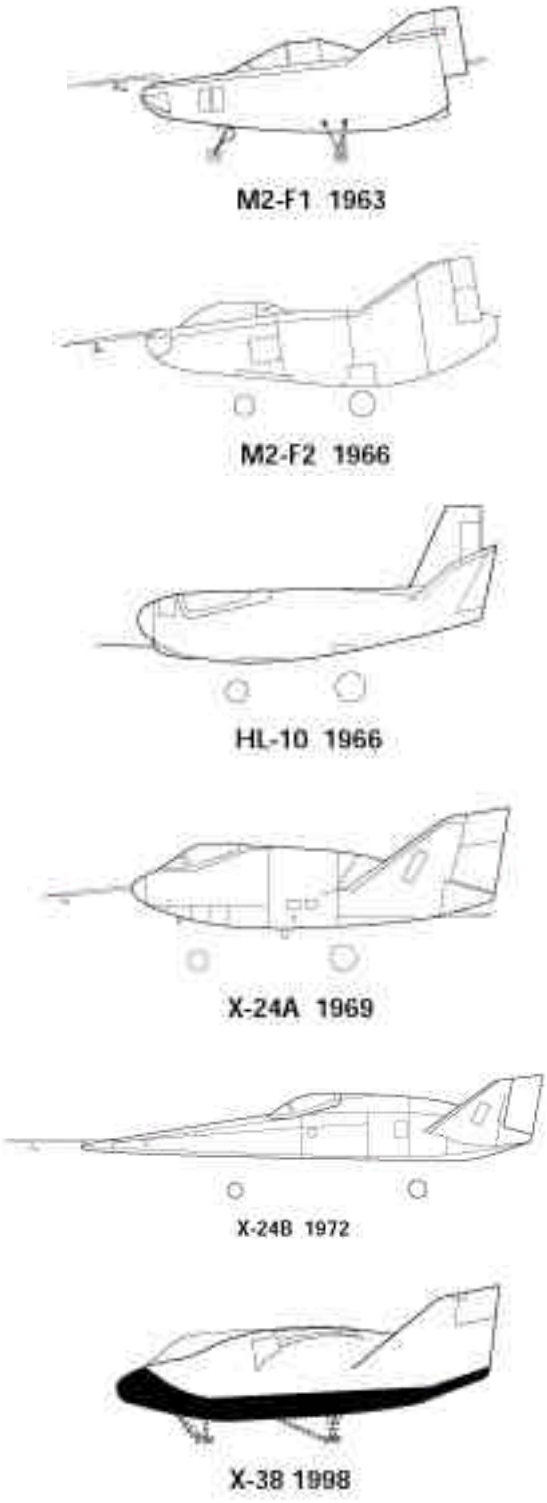
wind tunnel: Tubular structures or passages, in which high-speed movements of air or other gases are produced. Objects such as engines or aircraft, airfoils, and rockets (or models of these objects) are placed inside of the wind tunnel so researchers can investigate the airflow around them and the aerodynamic forces acting upon them.

wing loading: Gross weight of an aircraft divided by the area of the wing. Aircraft that have proportionally large wings are said to be "wing-loaded," while those with smaller wings, such as most jet fighters, are said to be "fuselage loaded."

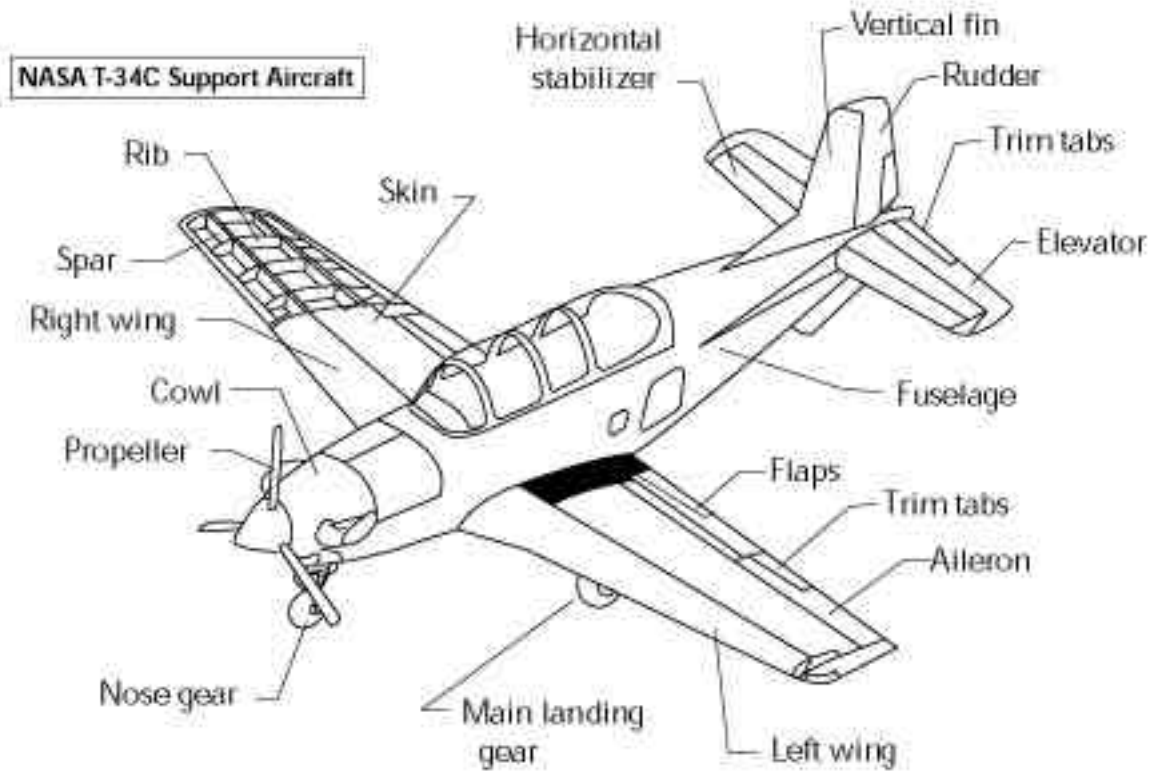
winglet: Small, nearly vertical, winglike surface mounted above the wing tip to reduce drag.

wing warping: A means to control aircraft roll by twisting (warping) the aircraft's wing tips. The Wright brothers used wing warping on their early gliders, and on their first powered aircraft. Although wing warping was discontinued in favor of ailerons on most aircraft since 1910, the concept is still considered valid for special applications on advanced aircraft.

yaw: A flight condition of an aircraft in which the aircraft rotates about its vertical axis. Yawing is different from turning because an aircraft can be yawed while flying straight with the wind striking it from the side. An aircraft follows a curved flight path when turning, with the wind always flowing parallel to its longitudinal axis.



NASA Wingless Research Aircraft



The Parts of an Airplane